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Underlying knowledge-knower structures in graphic design: Contributing to establishing a cohesive language for use in graphic design education

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Abstract

Providing a cohesive language for graphic design, which can be utilized in the production of knowledge and the generation of theory specific to that sub-discipline of Art and Design, is a challenge that is often obscured by the very practical nature of the field. As practice-based problem-solving is at the core of graphic design, application often supersedes meta-level theoretical engagement when it comes to educating undergraduate students. In this article, the underlying structures of graphic design pedagogy are explored through sociology of knowledge theories. We demonstrate how these theories enable the identification and analysis of those underlying structures, both epistemic and social, which influence how knowledge and the knower is constructed, taught and assessed in this sub-discipline. Applying these knowledge-knower structuring theories to analyses of empirical data collected from curriculum documentation and assessment events, we draw comparisons with data generated from formative and summative assessment practices. It is our intention that, through articulating a language of description and providing this example of the application of such methodological procedures for investigating such knowledge, a cohesive language may be shared that holds the potential to better inform curriculum development of the sub-discipline in higher education.

Keywords

graphic design

knowledge

knower

assessment

curriculum development

methodology

legitimation

Introduction

Graphic design is a relatively new and evolving discipline in Art and Design which in itself is made up of different interests, traditions and discourses (Armstrong 2009b; Margolin 2010; Muratovski 2016). Thus, any agreed upon or shared language of its own and the related procedures for investigation are still in the process of being clarified, as is illustrated by the timely focus of this Special Issue. Having a shared language is desirable as it 'enables the possibility of debate over something (a canon) and a shared means of conducting that debate (the shared sensibilities or dispositions of knowers)' (Maton 2014: 100). Once such content and dispositions are made more explicit, they can both be shared and challenged by those who constitute the community, thereby increasing the community's potential to move beyond the rules of thumb learnt by isolated individuals in limited contexts. As researchers, teachers and practitioners within higher education, we have been enabled to enter into such discourses and debates through the theoretically grounded language that we outline in this article.

The languages used to describe graphic design may relate to what the designer does, the types of thinking that design involves, the processes of designing, and the nature of design products. In much literature to do with learning through creative, practice-based processes, these are distinguished into foci on the person, process or product (Reid and Solomonides 2007; Spendlove 2007; Demirkan and Hasirci 2009; Belluigi 2013). However, there is difficulty in codifying practical or procedural forms of knowledge and in articulating how these forms of knowledge may be transferred to different contexts, as they can be awkward to describe or measure explicitly. The more tacit, experiential and procedural forms of knowledge are often not given the status or 'epistemic credit' of more conventional forms of knowledge found in mainstream academia (McGuirk 2011: 11). Regardless, multiple forms of knowledge and a diverse range of procedures for investigating and establishing such knowledge are both accepted and encouraged in graphic design (Bennett 2006). Strong influences from multiple contexts, compounded by the challenges of working with complex problems, necessitate that the graphic designer, as the specialist knower in this discipline, develops the capacity to integrate multi-disciplinary knowledge while engaging with different forms of knowledge.

Although it is undeniably fundamental that students learn how to design, it is important for transparency and fairness in higher education that students comprehend what forms of knowledge are valued, and the procedures used to produce knowledge in this discipline. Thus compelling arguments have been made to suggest that, instead of trying to reach consensus on *what* design is, we should rather be concerned with '*what design knowledge is*' (Carvalho et al. 2009: 485, original emphasis). Developing the language and related procedures that may productively be utilized to establish and investigate the discipline's knowledge, in all its potential forms, would considerably contribute to grappling with how graphic design knowledge is constructed and taught in higher education. Towards this end, this article

outlines a theoretically grounded approach to describing the valued knowledge of the discipline of graphic design and how knowledge and knowers are constructed, taught and assessed through naming the underlying structures that underpin the discipline.

This article aims to contribute to the establishment of a cohesive language by describing both the ideal knower and valued gaze in graphic design. Motivated by contestations of such constructions, of those who constitute communities and who are most legitimated as in-group members, we argue that excavating such constructions is important for developing criticality of practices that may reproduce unjust relations. Drawing on knowledge-knower structuring theories and concepts from the work of Basil Bernstein (1971, 1986, 1996, 1999) and Karl Maton (2004, 2014, 2016), the article outlines an analytical language in its first two sections, and then discusses ways in which we applied that language methodologically to an empirical case study of graphic design assessment. We provide insights into how the theoretically grounded language increased the validity of our research by informing the construction of a survey to generate data from lecturers, in addition to an analytical framework to study data collected from course documents and assessment events.

Developing a language for the struggle over legitimate knowledge in graphic design: Fields, regions and horizontal knowledge structures

In describing educational processes, Bernstein (1986: 32) utilizes the term ‘pedagogic discourse’, which he presents as ‘a principle for the circulation and reordering of discourses’. He argues that the metaphorical grammar or rules of the pedagogic discourse are controlled in three fields that make up a pedagogic device. The fields are distinguished as that of production, where knowledge is distributed; recontextualization, where it is selected for use in curricula; and reproduction, where it is utilized in the classroom, studio and for assessment (Bernstein 1986). Each of the fields has principles that define, control and communicate what

knowledge is legitimated, the behaviour considered appropriate, and how achievement is defined (Bernstein 1986). It is to these fields we turn our attention in this section, as we found they enabled us to identify how graphic design knowledge operates in Higher Education. Distinguishing between these three fields enables us to determine how legitimate knowledge may shift when transferred from one field to the next. In these spaces, ideology and power come into play (Bernstein 1996).

Examples of struggle and contestation in graphic design can first be seen in the field of production where new knowledge is established by different groups, using a range of procedures and distributed in different forms. For instance, the knowledge generated using the more traditional, practice-based or practice-led forms of academic research, might appear as propositional knowledge that is peer reviewed and circulated in journals and at conferences. New knowledge may also be created in industry environments in the form of acknowledged processes, practices, iconic designs, designers and what Wang and Ilhan (2009) refer to as a professional design identity. The range of knowledge sources that feed graphic design with its 'professional knowledge curriculum' (Burns et al. 2015: 202) align with a structure that Bernstein (1996) refers to as a *region* commonly found in professions and vocations. Regions face in two directions as they draw knowledge and societal structures from other disciplines and regions on one side, and from outside influences such as technology, industry and professional practice on the other side. Figure 1 provides an example of such a structure.

[Figure 1 positioned here- Figure 1 regions.jpg]

Figure 1: Graphic design as a region.

The range of procedures for investigation and varied forms of knowledge in graphic design provide material for ongoing debates about knowledge as embodied in practice, product and process. Concerns include that the under-development of theory and a related discipline-specific language might be interpreted as weaknesses in the discipline when compared to more theoretically established disciplines, such as architecture (Armstrong 2009a). Abstract generalizable theories have traditionally been viewed as the epitome of knowledge-building, what has been referred to as *powerful knowledge* (Wheelahan 2007). However, these can appear disembodied, decontextualized and insensitive to the significant problems encountered in the world today (Shay 2012). The solving of such complex problems is one of the common goals to which all forms of design aspire (Wang and Ilhan 2009). In the field of recontextualization, specific knowledge is selected and adapted for use in education. Chosen and validated by those who control the process, this knowledge appears in curricula content and methods. It is important to note that there may not always be consensus regarding the knowledge selected for such use, which on the ground may be reflected in the gaps between what is espoused and what is practised. Such contestation of valued knowledge plays out in tensions between the significance of theory versus practice; disciplinary-specific versus multi-disciplinary knowledge; academic versus professional knowledge.

In the third field of reproduction, knowledge that is reproduced in pedagogy is seen to be regulated by the *evaluative rule*, which controls the knowledge and attributes used to determine success (Bernstein 1986). As with the other two fields above, there may be disputes over the valued knowledge at this stage, particularly when negotiated during graphic design panel marking sessions. Common across assessment in Art and Design is the recognition that criteria are often slippery to define or articulate explicitly (Morgan 2011), such that students and other stakeholders may feel that the high-stakes decisions made during assessment are subjective or lack substantiation (Gordon 2004). Some argue that it is possible

that the referential frameworks for interpretation are so deeply embedded within such disciplines, that the languages of outcomes and criteria, adopted from educational development discourses, may be inadequate for the task (Belluigi 2015). In the larger study of graphic design pedagogy (~~Author~~ Giloi 2016) from which this article arises, assessment emerged as critical not only because of its summative gatekeeping role of regulating progression, graduation and entry to professional practice but because it communicates and legitimates what is valued in the discipline to a range of stakeholders.

Of importance are two potential knowledge structures that may be communicated at the different stages of production, recontextualization and reproduction (Bernstein 1996). In *hierarchical knowledge structures* knowledge is explicit, the language coherent and the aim of the discipline is to integrate theories towards achieving higher and higher levels of abstraction. Physics is an example of a hierarchical knowledge structure that has a common, well-defined language that participants acknowledge as physics and thus reproduce. The contrasting knowledge structure, which underpins graphic design (Clarence-Fincham and Naidoo 2013; ~~Author~~ Giloi 2016), is a *horizontal knowledge structure* that consists of a number of different languages (Bernstein 1999). These languages are open to revision, challenge or replacement over time, thus providing 'the possibility of a fresh perspective, a new set of questions, a new set of connections, and an apparently new problematic, and most importantly, a new set of speakers' (Bernstein 1999: 162). For such speakers to be accepted and then to act powerfully as disciplinary agents, they would need to acquire a disciplinary gaze to recognize and engage with the valued language. The horizontal knowledge structure of graphic design is indicated in the commonplace claims that graphic design is a science and/or an art. These seemingly contradictory categorizations that we argue emerge from two different languages, each with their own accepted objects of study and methods of investigation utilized to establish knowledge.

As with other horizontal knowledge structures, the role agents play is important to the formation of epistemic structures and not independent of them. Thus we turn from a focus on the epistemic to theories that enable us to articulate a language for the social.

Developing a language for social structures: The knower and gaze in graphic design

Bernstein's theories and concepts outlined above are expanded in Maton's (2004, 2014) Legitimate Code Theory (LCT), where he proposes that both knowledge and agents or *knowers*, be considered when determining the underlying structures of a discipline. In certain disciplines, participants demonstrate specialist knowledge and dispositions that permit them access to, participation in, and the power to contribute to, the discipline. We found that LCT, specifically the dimension of specialization, is enabling in that it provides a language to describe the object and subject, and thereby establish the significance of *epistemic relations* and *social relations* (Maton 2004, 2014) which differ between disciplines and may even differ between the various disciplines of design.

It is important to remember that a key aim of education in graphic design is to develop legitimate knowers into the field and assist them in acquiring the appropriate practitioner disposition (Logan 2006; Clarence-Fincham and Naidoo 2013; Burns et al. 2015). These dispositions, which include 'aptitude, attitude and personal expression' (Maton and Howard 2016: 55) are part of a professional identity that students are expected to develop. In the language of the previous section, those who participate in horizontal knowledge structures are expected to display a disciplinary *gaze* in order to engage with the valued knowledge and procedures of the discipline. The gaze, which may be largely tacit and therefore not clearly stated, is reflected in such phrases of embodiment in Art and Design as having a feel for ceramics or an eye for photography.

The relative strength of the gaze is determined by how difficult it is to acquire and may be defined as either a 'born, social, cultivated [or] trained' gaze (Maton 2014: 95). The born gaze is considered the strongest form of gaze as it is highly inaccessible and presumably cannot be taught. The concept of a born gaze, evident in claims that graphic designers need 'God-given talent' (Rand 1987: 65), has emerged from the innate tradition of creativity prevalent in Art and Design since the workshop guild in higher education (Cowdroy and de Graaff 2005; Belluigi 2010). Although this highly contentious concept of creativity has been critiqued in creativity research (Dallow 2002; Freeman 2006), it continues to haunt much art education (Darras 2007). The identification of talent may be a validation of students within a course who bring with them what is considered the appropriate cultural capital or who already possess the socially situated gaze valued by those within the discipline (Webster 2010; Gaztambide-Fernández et al. 2013). Given the worldwide proliferation of institutions that have taught and continue to teach graphic design, there is an assumption that graphic design can be learnt and therefore that aspects of engagement require the cultivated gaze. That the gaze in graphic design can be cultivated was established in the empirical study of assessment that we drew on to inform this article (~~Author~~ Giloi 2016). Unlike the born gaze, the cultivated gaze can be acquired or developed over time through immersion in practice, and from exposure to iconic work and ideal knowers (Maton 2014). This could take place in master-apprentice relationships or in engagement with fellow practitioners in a professional community. The gaze is necessary to access and engage with knowledge, bringing the social and epistemic into proximity. However, in disciplines such as graphic design, where the gaze is largely tacit and the valued knowledge varied and ill-defined, the gaze that is most legitimated cannot be presumed to be accessible. Of concern is that students, who do not bring the *appropriate* cultural capital, may be seen as the 'wrong kind of knower' (Maton 2004: 224).

In the sections above, theories and concepts have been articulated into a broad language for identifying knowledge and knowers structures in graphic design. We now apply, and in the process refine, this language in order to establish the relative strength and weaknesses of these epistemic and social relations in the cases studied.

Applying the knowledge-knower language of description to empirical data from graphic design

The theory and concepts outlined above were utilized, first, as a framework to identify potential epistemic relations and social relations in the graphic design field of production where knowledge is circulated. Second, they informed the construction and analysis of an online survey completed by graphic design lecturers. Third, the framework was applied to the analysis of four studio-based subjects, drawing on course documents (inclusive of information on the briefs, learning outcomes and assessment criteria); and observations and recordings of individual and panel marking sessions of seven formative and nine summative moderation sessions.

Assessment has long been recognized as a productive focus for research (Elton and Johnston 2002; Barrow 2006; Cowdroy and Williams 2006; Harman and McDowell 2011). Assessment also provides insight into the underlying knowledge structures that are implicitly or explicitly valued in disciplines. It is there that the evaluative rules of the graphic design game are negotiated, and where the knowledge, skills, attributes and behaviours are de/legitimated in the field of reproduction.

The provisional findings, from the triangulation of these analyses, were evaluated by a member check focus group discussion involving five academic staff, with a range of experience of assessment in graphic design. The findings were reported in full as part of a doctoral dissertation (~~Author~~ Giloi 2016). For the purposes of this discussion, the key

findings of the empirical analysis of the third stage of the process outlined above, to do with the analysis of Graphic Design Studio 1, 2 and 3, are included in this article.

During the analysis of the related course documents and the data generated by observing and recording formative and summative assessment practises, clear themes emerged. These themes formed the basis for a language of description where data could be categorized into epistemic relations or social relations, as outlined in Table 1.

Epistemic relations	**Social relations**
Design theory and rules	Aesthetic characteristics of the product
Technique and methods	Concept emerging from critical, creative thinking
Knowledge relates to industry or real world, including sustainable design	Design process from research to production
Multi-disciplinary knowledge	Appropriate professional and scholarly behaviour
	Product illustrates integration of concept, aesthetic, technique and function for effective communication

Table 1: Themes relating to epistemic and social relations which emerged from the cases studied.

As an example of the themes identified, *design theory and rules* included elements such as colour theory, typographic hierarchies and the principles of design, composition and layout. *Multi-disciplinary knowledge* emerged from examples where students were expected to investigate subjects such as culture, target markets, symbolism, language, history and politics

in order to inform their design decisions. These were categorized as epistemic relations as they have explicit practises and objects of study. In comparison social relations related to the disposition and gaze that students were expected to develop. Examples included *professional behaviour* such as presenting work that was complete and neatly presented. A key theme identified was the expectation that students could create designs that showed an integration of concept, technique and aesthetics appropriate to the context. This was classified as social relations as it required a specialist gaze on the part of the student.

To identify the relative strength or weakness of epistemic relations and social relations, these categories were further refined. The concepts of *classification* and *framing* (Bernstein 1971) and the levels of design expertise (based on the typology proposed by Steyn [2012]), were found to be most useful. The levels of design expertise provided a typology for describing how the designer progresses through various stages of achievement that require making decisions for increasingly complex problems. The principles of classification and framing and design expertise are indicated in Table 2.

	Examples of classification	**Examples of framing**	**Examples of the level of expertise**
Stronger epistemic relations (ER+)	Clearly bounded knowledge Specific object of study Limited procedures used to investigate Specific physical space	Little or no choice of content, pace and ordering Little or no choice of evaluative criteria and assessment types Acceptable behaviour is clearly defined	Prescriptive learning criteria are positioned in a generalized context Obedient learner follows rules

	Knowledge from many disciplines integrated by the knower along with their experience Object of study is not clearly defined or always explicit Different procedures used to investigate object Physical space may be multipurpose	Acquirer chooses content, pace, ordering of what is learnt Acquirer chooses evaluative criteria and assessment types Knower needs a specialist disposition and gaze to make knowledge claims	Complex problems positioned in real world contexts Self-reflective learner
Stronger social relations (SR+)			

Table 2: Examples of classification and framing.

In the case study, the relative strength of epistemic relations was determined by how clearly bound the knowledge was. For instance, where the typographic principles and a specific technique were explicitly defined in a brief and students were required to follow these closely, this was identified as stronger epistemic relations (ER+). This was an approach most common in the first year of study. The influence of framing was determined by the amount of autonomy the student had in choosing content; the pacing and sequencing of their learning; in addition to the role they played in assessment. Social relations were considered stronger (SR+) when each student could define the design problem in addition to conceptualizing and producing their own solutions. At a second- and third-year level of study, it was espoused that students could negotiate assessment criteria to some extent, as they were expected to articulate in writing their objectives for certain briefs and to justify their decisions throughout

the design process. However, observations of the assessment practices revealed that these written texts were seldom considered by assessors.

The levels of expertise typology assisted with identifying the specialist graphic design gaze that was an integral element of social relations. At lower levels of expertise, students applied common sense to making design decisions. However, at the higher levels of expertise required for the third-year level, students were expected to integrate concepts, aesthetics and technique while using industry and multi-disciplinary knowledge in order to solve complex, ill-defined problems.

From the analysis of the course documents and observed assessment conversations, we identified the organizing principles of the practice as *specialization codes* (Maton 2014). Specialization codes indicate which practises impact on knowledge structures. As outlined in this section, these codes are revealed by studying the relationship between the object of knowledge and the subject, that is the strength of epistemic relations (ER) or social relations (SR). The specialization code modalities can be defined as an *elite code* (ER+, SR+), a *knowledge code* (ER+, SR-), a *knower code* (ER-, SR+) and a *relativist code* (ER-, SR-) (Maton 2014: 30–31).

Identifying varying strength and weaknesses of epistemic relations and social relations enabled us to establish the specialization codes that were within espoused theory and the theory-in-use in undergraduate graphic design practice (represented in Figure 2 and 3).

[Figure 2 positioned here – Figure 2 first year.jpg]

Figure 2: The relationship of specialist codes in first-year undergraduate graphic design.

The Graphic Design Studio 1 learning outcomes and assessment criteria, as explicitly stated in the curriculum documentation, communicated a relativist code. Thus we positioned it within ER- and SR- in Figure 2. This code reflected the aims of the course that were to introduce the novice student to graphic design techniques, industry knowledge, rules of design, and multi-disciplinary knowledge. At this stage, the student had little choice over aesthetic aspects and the design process, with no expectation that the concept and form of the work demonstrate a high level of integration. Thus neither knowledge nor knower was highly privileged over the other in terms of value.

However, when analysing the panel assessment of first-year work, a knower code (ER-, SR+) emerged as being valued by the assessors at both the formative and summative assessment stages. Thus a *code clash* (Maton 2014: 77) between the espoused criteria in the course documentation and the enacted criteria, was identified. The knower code, as valued by assessors, was relatively weak thus its placement closer to the centre of the SR axis in Figure 2. The relative weakness was indicated in how submissions that were considered not particularly strong aesthetically or conceptually, but which met certain technical requirements, were permitted to be graded as successful at this level.

For formative assessments, the valued disposition was indicated when the statements assessors made acknowledged good attendance and participation; a willingness to re-do work, ask questions, and follow the lecturer's instructions; and when the work submitted appeared neat, complete and on time. Even at the summative stage, moderators who did not know the students projected certain student behaviour on the submitted product. For instance, it was assumed that students were 'lazy' when unfinished work was submitted. Comments such as 'that would get you fired [from employment]' were made when unfinished work was being

assessed. At the second- and third-year levels of study, assessors also referred to how clients or employers would react to such work or behaviour. Such comments are indicative of how assessors act as gatekeepers to the profession (Logan 2007) and to licencing through the academy and draw from their professional and academic identities and behaviours as ideal knowers in this region. While the region of graphic design is the focus in this article (see Figure 1), this has been found to be common to other Arts and Design regions (Harman and McDowell 2011; Orr 2011; Belluigi 2015).

[Figure 3 positioned here – Figure 3 all years.jpg]

Figure 3: Identifying the relationship of specialist codes in undergraduate graphic design.

Analyses of the course documents and the observed assessment practices revealed that the knower code strengthened in the second- and third-year of study, which indicated that the specialist gaze might be cultivated. The briefs set for students became more industry situated and open-ended, enabling the design solutions to become more student-directed. Students required a gaze of increasing sophistication to meet the level of decision-making and expertise necessary. Assessors expected that the multi-disciplinary knowledge selected for use, the design process, product, in addition to the technical and aesthetic aspects, be in alignment with the student-defined solution. Students at this level were therefore expected to be able to demonstrate the ability to integrate and communicate all aspects effectively. Thus the valued knower moved from being an *obedient* first-year learner who followed the course documents and the lecturer's instructions, to an autonomous learner who defined the design problem, solution, process and product. At a third-year level, this required stronger social relations when compared to what was valued in first-year work. The strengthening is represented in Figure 3 by the shift of the Graphic Design Studio 2 and Graphic Design

Studio 3 positioning towards the stronger limits of the SR axis. The knower codes valued in the theory-in-use demonstrated in the course documents and the assessment practices observed, clearly strengthened in each year of study.

By applying the theorized language to the cases studied, the underlying knowledge-knower structures valued in graphic design assessment were unearthed in this analysis. Once we articulated these, the shifts in the various years of undergraduate study became evident. Clearly valued was a knower code in the assessment practices, compared to the relativist code espoused in first-year course documentation. However, as a description of the valued gaze was seldom explicitly stated, and assessors relied on an assumed common understanding of this gaze, based on their shared education and industry experiences, it is possible that students may not have had access to this gaze as it is largely tacit (~~Author~~ Giloi 2014, 2016). The tacit nature of the rules that governed assessment confirm notions of the 'mystification' of graphic design education and practice (Burns et al. 2015: 202).

Knower code disciplines, which have contested languages and a valued gaze(s) which may be tacit, may unwittingly result in what has been described as an 'invisible' pedagogy (Bolton 2008: 6) or a 'pedagogy of silence' (Bourdieu and Wacquant 1992: 223). With such a pedagogy what is valued in a discipline is not clearly communicated in a consistent and accessible way, limiting students' access to the privileged knowledge, disposition and gaze, which has implications for social justice. Certain students or groups of students, who do not bring with them the foundations of the gaze when they start their studies, may be excluded or alienated. Furthermore, shifts in the strengthening of a code may be imperceptible and confusing to students, leading to a lack of transparency about grades awarded, reducing their formative value and creating conditions for dispute. In addition, the lack of an explicit language and the assumption of shared tacit understandings may lead to a misperception that graphic design practice, encompassing knowledge and knower, is subjective, local and

context-bound when the region actually requires knowers who can negotiate and develop a practice that is transferable to multiple contexts.

Making the knowledge-knower structure of graphic design more explicit, and defining the dispositions valued, may enable more robust development and evaluation of graphic design curricula, pedagogy and assessment. As Shay and Steyn (2016) suggest, using such theoretically grounded frameworks can assist with making curriculum designers more cognizant of sequencing across the levels of design courses, and the forms of pedagogy that would facilitate the development of the valued gaze for a discipline of design. While those engaged in curriculum development would be best placed to consider the fields being negotiated, students would benefit from being made more cognizant of how the region is informed and influenced and how they might more critically move between the various graphic design forms of knowledge and gazes.

Conclusion

This article has attempted to develop a cohesive language to articulate knowledge-knower structures in graphic design education, towards establishing shared procedures to study that dispositions and gazes are valued in the theory-in-use, rather than adopting those espoused as ideal or aspirational abstractions. By demonstrating their analytical application to empirical data gathered and collected from graphic design pedagogy, in this article we propose that the knowledge structuring theories of Basil Bernstein (1971, 1986, 1996, 1999) and Legitimation Code Theory of Karl Maton (2004, 2014, 2016) provide useful concepts and terms to describe the underlying structures of the discipline of graphic design. Theories such as these, which are inclusive of the epistemic and the social, enable consideration of the *what* and the *how* in addition to the *who* of graphic design. Using these theories to build a consistent language enables scholars and practitioners to more robustly identify, share and question

what is valued in the discipline of graphic design, and to transfer such findings across contexts and between professional and educational practice.

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